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The Dzierzon Theory.

BY THE BARON OF BERLEPSCH.

No. II.

The first proposition which we are now to consider, is in the following words:

1. A colony of bees in its normal condition, consists of three characteristically different kinds of individuals—the queens, the workers and (at certain periods) the drones.

All this will be readily conceded. But there are some apiarians who contend that there is, in every colony, a fourth kind—the *black bees*, quite as distinct as any of the others, and to which they ascribe the function of laying the drone-eggs. This seems plausible, too, for it is an undeniable fact that bees do occur which are distinguished from the rest by their darker color; and the question can only be whether the blackness of those bees is an accidental trait or constitutes a characteristic difference. Dr. Magerstedt contends that the color is constitutional, and enumerates besides not less than twelve other points of difference between these black bees and common workers. Thus, among other things, he alleges that these bees are black when they emerge from the brood-cells; that their proboscis is much shorter; that they have no corbicula on their thighs; that they have a smaller sting, and possess ovaries. It is hard to contend against facts, if these be facts—which I cannot concede. Among the many thousands of young bees which I have seen emerge from the brood-cells, I never saw one come forth of any other color than a lightish-grey. All the black bees I have ever observed in my apiary have probosces as long as others, corbicula as deep, and stings as large. As regards the existence of ovaries, I cannot venture to decide, as I

have neither the talents nor the instruments requisite for so delicate an investigation. In the interest of science, however, I will cheerfully pay the expense of an examination by some competent physiologist, provided his report be illustrated by drawings on a scale sufficiently large to show the eggs in the ovaries, and render obvious to all, the difference, if any, in the probosces, stings and corbicula. I would further suggest that before comparison is instituted, the specimens of common workers selected be deprived of their hirsuties, or at least thoroughly wetted. Possibly if this were done with an entire colony, the operator might discover that he has before him black bees exclusively—precisely similar in all respects to those which have been termed *drone-mothers*! I am not disposed to be jocular, but there cannot be a doubt that all the allegations of Dr. Magerstedt to which I have referred, rest on sheer delusion. Excepting the variation in color, and the greater or less absence of hair, there is no physical difference whatever between the common and the black bees. The unprejudiced use of one's eyes, is sufficient to settle this point conclusively.

But in what way do these bees lose their hair? Or, rather, how do they become black? Is it the result of age, or of toil? Not precisely. Toil-worn veterans are easily known by their dark-brown color, and lacerated wings, whilst these are of a glossy-soot color, sometimes even coal-black, and have generally uninjured wings. The *former* are the kind which may be found in large numbers, almost every summer, when there are abundant and long-continued supplies of pasturage. They are the oldest among the workers; those which have labored longest and most industriously, on the blossoms of such plants as the centaurea, euphorbia, &c., and whose coats, as Mr. Frank graphically expressed it, have become *seedy* or

"shabby genteel" in the service. The *latter* kind, the glossy-sooty black, appear early in the spring, not indeed in every colony, nor in large numbers, but singly, here and there, and have all disappeared before autumn. Yet catch one of these, scrutinize it with the utmost care, and you will find you have—nothing but a common worker.

I have often compared with each other these two differently shaded black bees, and have always found that the prime color of the latter was a sooty or glossy-black, while that of the former was a brownish-black. This was the case still when the latter was more completely deprived of its hirsuties than the former. This led me to conjecture that the glossy-sooty color did not result from the loss of hair; but that some other influences had operated on the corneous tunics of those bees.

The common opinion is that the darker color of these bees results from their having been besmeared with honey; and that they are those precisely, which have been most frequently and longest engaged in robbing other colonies of their stores. To test this, I made the following experiment:—I set before a populous colony, in which I could not discover a single black bee, a plate of honey, and when it was densely covered with bees, I poured honey on them, and left them till they had been licked clean by their companions. I repeated this on four successive evenings, and finding that not one sooty-black bee was to be found amongst them after the operation, I concluded that this peculiar color was not produced in the manner supposed. Nor could I find that it resulted from creeping through crannies and crevices, nor from occasional combats with bees into whose hives they attempted to intrude. Careful investigation satisfied me that nothing of this kind could produce the effect.

Finally, an accident, or rather a mishap, led to the discovery of the cause, and convinced me that Mr. Südz had, as early as December, 1848, substantially surmised the truth.

In April, 1852, I exhibited my glass hives to a friend then visiting me, who was so delighted therewith, that he expressed a strong desire to obtain one. I promised to gratify him, but as the combs in mine were already much discolored, I proposed to stock a new hive for him, with a swarm, at the proper season. A hive was immediately procured, and on the 19th of May, I introduced in it an unusually large swarm. The bees had nearly all entered, when a servant came to announce the arrival of company. To receive them, I left the work unfinished, and could not return for nearly two hours. When I got back, I

found the exterior of the hive densely covered with bees, and at once conjectured that another swarm had lit on it. The crowd had literally choked up the entrance, and from the great heat in the hive, and the want of air, fully two-thirds of the bees were suffocated, and all were dripping with perspiration. As a sufficient number to form a colony still survived, and I did not find the queen among the dead, I set matters in order and placed the hive in my apiary. Next morning I was greatly astonished to see hundreds of glossy soot-black bees, issuing from and entering this hive. For more convenient observation I transferred the colony next day to a more suitable hive, and soon satisfied myself that these black bees were Matuschka's and Magerstedt's famous *drone-mothers*—precisely similar in all respects to samples which I had seen on various occasions.

1. Their ocellae seemed more prominent, their bodies thinner and slenderer, their corbicula smaller and shallower—all because they had no hair.

2. The head seemed further and more distinctly separated from the thorax, and this again from the abdomen—because from the absence of hirsuties, the insectations were simply more obvious.

3. They appeared generally to be more supple and active than common workers, because from their nudity the movements of the limbs were more perceptible.

4. Many of them appeared to *drag* their abdomen along, as though their muscular power were somewhat impaired.

5. They carried in no pollen, or at most only mere rudimentary pellets; because these could not be securely retained in the corbicula denuded of their bristly fringe.

6. They showed no disposition, even in the pleasantest part of the day, when pasturage abounded, to rifle the flowers of their sweets. Hardly one in twenty which I examined had its honey-bag filled, and then not with the nectar of flowers, but with pure honey. It is evident from this that robbing is their perilous pursuit, and that they no longer possess a predilection for gathering the nectar of flowers.

7. On every hand they endeavored to force their way into other colonies, because in accordance with their natural instinct they desired to appropriate honey, and the change which their physical structure had undergone, disabled them to gather from flowers. When other bees attempted to seize them, they shrunk away timidly, or fawningly presented their probosces, as all robbing-bees are prone to do under such circumstances.

8. When hovering about a hive, doubtful of

their reception, they hold their hinder legs suspended downward and rearward, as other robbing-bees do in similar circumstances—thus showing that they are consciously strangers.

9. Occasionally they succeeded in effecting an entrance; but generally they were seized and killed, or crippled, as such intruders usually are.

10. Observing on one occasion a considerable number of them entering a hive together, I watched for their return, caught several of them, and satisfied myself by an inspection of their well-gorged honey-bags, that their object was to steal the garnered stores.

11. Their numbers decreased gradually, and by the middle of August, they had altogether disappeared.

Now is not all this just the same as with the glossy-black bees noticed in so many different districts, and about which some bee books make so much ado? And is it not thus demonstrated that their loss of hair and their glossy-black color are ordinarily the effects of fright, perspiration and exposure to a hot and humid atmosphere? I say *ordinarily*, because I would not assert that other causes may not, at times, produce similar effects; though I much doubt whether merely wetting the bees thoroughly would work such a change of color and appearance. Often as, in the course of my experiments with bees, I had occasion to immerse entire colonies, not unfrequently keeping them wet for hours, when searching for the queen or picking out the drones, I never saw that the bees changed color in consequence. I have often, also, noticed bees returning to their hives after a shower of rain, in which they had been thoroughly drenched, but never perceived that the number of black bees was thereby increased.

The foregoing remarks will serve to elucidate several other points:

1. The black bees usually make their appearance in early spring, because during the winter the animal exhalations in the hive are strongest, most confined, and most penetrating. Some of the bees remaining quiet and almost motionless for a considerable period, are consequently the more thoroughly exposed to the effects of these exhalations.

2. They disappear in the fall, because during the summer the causes producing them, such as the one mentioned above, are comparatively inoperative, the bees being less confined to their hive. Those which were observed in the spring have either died from old age, or were destroyed, like the drones, as useless members of the community.

3. These black bees are not apt to sting, be-

cause they are usually encountered at other hives than those to which they belong; and being consciously trespassers and robbers, they are timid and will not attempt to sting, but eagerly seek to escape—"Conscience making cowards of them all."

4. Their sting is not particularly painful, because they do not, like other bees, edulcorate the nectar of flowers in their stomachs, and hence probably secrete a less virulent poison. Is there not, moreover, in this respect, a remarkable difference in the effect of stings in general? Is a sting as painful in early spring as it is when the lindens are in blossom? These are questions not easily answered. Some persons also are so organized constitutionally, or have in time become so habituated to the poison, that in them the sting of a bee does not at any time, or under any circumstances cause pain or swelling. Others are so accustomed to suppress their feelings, that, in all ordinary cases, they "grin and bear" such inflictions without wincing. Others again are so exceedingly sensitive, that a sting produces frightful swelling and dangerous illness. Who then can say that the sting of one bee is more, or less, painful than that of another?

5. At the time of the general drone-slaughter, as well as at other times in summer, dead black bees are occasionally found in front of the hives. These *may*, indeed, be common black bees, which have died a natural death, or have been massacred and cast out. But they may also be common workers which turned black in the agonies of death, if they were killed by suffocation—which is the usual process. Let any one examine a suffocated queen, and see if in every instance she be not found of a glossy-black color, with but a faint trace of yellow; and that workers also are, at times, subjected to the same species of capital punishment, is too well known to require proof.

6. They usually disappear at the general expulsion of the drones, because at that period all useless members of the community are banished. It is, however, not correct to say that they are expelled *en masse*, simultaneously with the drones; though till recently I was myself of that opinion. At this period many are cast out, and an unusual number of dead black bees are observed, and it thus came to be inferred that they are expelled or killed in the same manner, and as regularly as the drones. On the whole, more died from superannuation than from any other cause.

Having thus disposed of the case of the *black bees*, which is the only one ever seriously relied on as contravening the first proposition of the Dzierzon theory, we shall, in our next number, proceed to the consideration of the second proposition.

Workers not Monsters.

In an essay on "*PHYSIOGRAPHY, in its application to Grape culture*," recently published, occurs the following passage:

"Great men, as well as common folks, sometimes make great mistakes. Huber asserted that the neuter or working-bee, was nothing more nor less than 'an imperfect female.' That is mere conjecture, and will not answer in this matter-of-fact age. God never made whole races of his creatures mere abortions. He permits monstrosities occasionally, but never made so gross a mistake in the organism of an entire class."

Cherishing, for *auld lang syne*, a high personal regard for the writer, who, we feel assured, would not consciously make a misstatement, we regret the more to be constrained to say that, in the passage just quoted, he does Huber injustice. He ascribes to him views not entertained and sentiments never expressed, by that intelligent and indefatigable, though blind, old naturalist, whose lot it has been to be largely misapprehended and extensively misrepresented, by those even for whose benefit he labored.

In the "*New Observations on Bees*," Huber says: "The discovery of fertile workers, made by Riem and confirmed by my own investigations, led me to conjecture that the entire class of workers pertained to the female sex. Nature makes no sudden leaps. The fertile workers lay drone-eggs only, like those queens whose fecundation has been unduly delayed. One step farther and they might be altogether sterile, without being the less feminine essentially. *I do not regard the workers as ABORTIONS or IMPERFECT CREATURES.* They are endowed with too many noble faculties, too much unwearied industry and activity, and from their instincts spring too many marvels to permit me to consider them as ABNORMALITIES of their kind, or as imperfect beings in comparison with the queens. I believe that a rational philosophy will yet be able to reconcile all these difficulties."

This differs widely from the views attributed to him, and shows that with his mental eye he looked confidently to further discoveries, like those since made, whereby the mystery which in his day still enveloped the subject, would be elucidated, and the difficulties explained. He regarded the workers simply as physically undeveloped females, such as dissection and microscopic examination, subsequently demonstrated them to be; and saw clearly that such a condition was not incompatible with their position in the economy of the hive.

It is doubtless true that, if regard be had only to mere animal qualities, the queen is, in that direction more fully developed than the worker; and thereby becomes qualified to discharge properly her peculiar functions—the *perpetuation of the race*. This, however, does not constitute her a more perfect insect, absolutely, than the worker. The lat-

ter is quite as admirably adapted for her appropriate duties, and is, therefore, as regards the purpose and end of her being, as perfectly organized and as fully developed as the former. Both certainly proceed from the same kind of egg. That is a fact no longer to be controverted or doubted. Development proceeds in each in like manner, and in the same direction, from the hatching of the egg up to a certain point. Thence, owing to the circumstances in which each is placed and the influences to which it is subjected, development diverges and tends to different issues. In the queen it culminates *corporeally*, in the maturation of animal functions and procreative power. In the worker, it is made to take a different direction. The growth of physical organism is repressed indeed; but instead thereof, her physical qualities, or what might be termed her mental faculties, are extraordinarily unfolded and intensified. Hence, if manifestation of mind, however subordinate in grade or qualified in character, be entitled to higher consideration and regard than mere corporeal qualities or physical organization, the worker might claim a more elevated rank in the sphere of development than the queen, whose physical endowments are certainly of a lower order, and limited to a narrower range. Each, however, is perfect, as regards herself, her assigned relations, and the purpose and design of her existence.

It is precisely this undeveloped femininity of the workers, and the bringing out, instead, of other and higher faculties, which qualifies them for the functions devolved on them by the Creator—that of foster-mothers and protectors of the brood, and providers for the subsistence and preservation of the family. Whereas the sexually more fully developed inmates of the hive—the queen and the drones—physically less endowed, are designed and serve for the *perpetuation of the race*. Each kind has its proper sphere, each its appropriate duties assigned to it; and, by its organization and instincts, each is specially and fully qualified to discharge these duties. The proclivities, qualifications and habits of each are, in the main, as distinct and characteristically different from those of the others, as if each belonged to an entirely different class of insects. Yet the three kinds are so yoked together—so interwoven in action, so fitted for each other, so dependent on each other, and so complementary to each other, that neither could permanently exist without the co-existence—at certain seasons at least—of both the others.

☞ Are bees cold-blooded or warm-blooded creatures?

ORIGIN AND NATURE OF HONEY DEW.

In the annual report, for 1855-6, of the Royal Agricultural and Industrial School, of Landau, in the Palatinate, Mr. Th. Gumbel communicates the following results of investigations made by him respecting the origin and nature of honey dew.

1. Honey dew always makes its appearance when particular species of plants have developed their blossoms.

2. The ripe pollen-dust falls not only on the stigma of the blossom, but is generally in large part scattered on the leaves and other succulent portions of the plant, as well as on those of neighboring plants.

3. If the pollen-dust thus scattered becomes exposed to dew, it will rapidly produce a *carposma*. This term designates a peculiar vegetation of the pollen-grains, in consequence whereof, from a portion of them, which were already contained in various forms and sizes in the anthers, a gummy-granular substance exudes. Others produce so-called pollen-tubes; and others again generate within themselves, mature and extrude, still more diminutive grains. What the original pollen-grains thus undergo in this three-fold manna, is in turn undergone by the young brood also. The ultimate result is a mixt mass of pollen-grains and of successive generations of brood cells, which finally decompose and disappear as cellules resembling yeast cells or mould sporules.

4. If this *carposma* be brought under influences more than simply propitious to its development, a luxuriant growth is superinduced; and the cellules, instead of undergoing decomposition, are converted into so-called mycelium filaments, and are then capable of originating fungous organisms.

5. When the *carposma* has been formed in a globule of dew, it fixes and retains by its vegetative power, the humid atmospheric depositions; and we have the phenomenon of honey dew in the proper sense of the word, as a clammy substance dropping from leaf to leaf.

6. Honey dew as found on the leaves of plants, is precisely similar to the nectar of flowers, which, as in the cup-shaped sepals of the Linden, does not exist already when the blossom expands, but is produced only after the pollen-dust has fallen into them and been changed to *carposma*.

7. In the honey gathered by the bees, the *carposma* producing it—that is, the pollen-grains of those species of plants from which it was gathered—may readily be traced.

8. Honey dew proper is not the product of aphides, which have commonly been supposed to secrete and extrude it as a saccharine matter, covering therewith the foliage of plants and trees.

9. Neither is honey dew a consequence of the rupture of superficial leaf cells, permitting the extrusion of saccharine juices, which are alleged to issue at times with such force as to bespatter the walls of conservatories. Experiments made with pollen-grains on glass plates, have resulted in the formation of *carposma*. The occurrence of honey dew on walls, may hence be accounted for, without attributing it to the violent disruption of leaf cells.

10. If rain immediately follow the occurrence of honey dew, it will be washed off and the leaves remain healthy.

11. But if honey dew dry on the leaves and thus become fixed, the *carposma* may justify its name and superinduce a premature ripening of the leaves; which then become discolored with dark spots, and drop off soon after the blossom withers. This happened in this region, last summer, to the Lombardy poplar, which was thus nearly denuded early in July, though the black poplar remained in full foliage. Thus likewise the peach, plum and cherry trees exhibited diseased foliage last spring, and the nut trees lost their leaves soon after blossoming.

12. The functional efficacy of the pollen-grains is not confined solely and exclusively to the stigma of the germen. The great abundance of the pollen is of itself an indication that its influence extends also to other organs of the flower, and thus to the peripheral portions of the fruit.

13. The functional efficacy of the pollen-grains is not brief and transitory, but frequently of very protracted duration. Many blossoms, after having expanded, close again, thereby retaining and confining a large portion of the pollen-grains undispersed; just as though a kind of digestion or maturation thereof were designed or required for the more complete development of the pericarp. Thus the pollen and its *carposma* may be traced not only in the ripe fruit of plants which have the calyx-tube adherent to the ovary, such as the currant, gooseberry, apple, pear, &c., but likewise in those which have the germen nude, as in and on ripe cherries, grapes, &c.

14. If this *carposma*, thus normally retaining its efficacy for a protracted period, and thereby hastening the ripening of fruit, becomes exposed to the influence of a foggy atmosphere, so that its short-jointed filamentous tissue be transformed into mycelium, diseased organisms result, such as the grape fungus, *Oidium Tuckeri*; or the cells of the organ affected by *carposma*, and thus overstimulated to premature ripeness, develop as a pseudo-organism, tending to internal decomposition, such as the potato disease, *Botrytis infestans*.

15. According to proposition 13, the carposma of the pollen-grains may be traced even in the must of grapes, apples, pears, currants, cherries, &c.; and it is probable that ripe barley, even when converted into malt, still retains the carposma from the period of blossoming.

16. The striking resemblance between the ultimate brood cells of carposma and yeast cells, not merely warranted the conjecture that the carposma contained in the must of fruits, furnishes the primary elements of a ferment; but actual experiment has shown that the carposma of the Linden blossom, when introduced into a solution of sugar candy, speedily superinduced fermentation.

17. The rapid formation of honey dew is intimately connected with the rapid production of yeast cells. In the former case, sugar is produced; in the latter, sugar is decomposed.

SIZE OF COLONIES.

1. On the 16th of June, 1855, I prepared two hives, by inserting in each a set of sixteen frames furnished with guide comb. Both sets were of exactly the same weight, and were arranged in two tiers, in the same manner in each hive. I then introduced in the one a swarm of bees weighing six pounds, and in the other a swarm weighing three pounds, and gave them queens which, judging by the hives they were taken from, were equally fertile. On the 8th of October following, when all the brood had emerged in each, I took out the frames, and brushing off the bees carefully, weighed each set separately. On deducting the weight of the frames and guide combs, I found that the combs built and filled by the six-pound colony weighed 40 lbs. $6\frac{1}{2}$ oz., and those built by the three-pound colony weighed 17 lbs. The product, in combs and honey, of the larger colony was thus ascertained to be 6 lbs. $6\frac{1}{2}$ oz., more than twice the product of the smaller colony; and this excess was the result, exclusively, of the greater *working force* which that colony had from the start. This experiment shows that three pounds of bees are insufficient to enable a colony to labor advantageously.

2. I repeated the experiment in the same manner in 1856, excepting that I gave the weaker colony four pounds of bees. The season was unfavorable, and on the 15th of October, the stronger colony had produced only 19 lbs. 2 oz. of combs and honey, and the small 10 lbs. 9 oz. Hence the stronger had produced, proportionally, only 3 lbs. $4\frac{1}{2}$ oz. more than the weaker.

3. Simultaneously with this second experiment, I fitted up another hive in like manner, and

introduced in it a swarm weighing five pounds.—Weighing the product of this colony at the same time in October, it proved to be 15 lbs. 15 oz. I judged hence that six pounds of bees was probably about the weight which a swarm or colony should have when hived.

4. In 1857, which was an unusually good honey year in my neighborhood, I again repeated these experiments, giving the stronger colony seven pounds of bees, and the weaker six pounds. The result, as ascertained in October, when all the brood had emerged, was that the stronger colony had produced 50 lbs., and the weaker 50 lbs. 11 oz.

These experiments are certainly not to be regarded as furnishing a rule applicable under all circumstances and in all localities. But they show that in a comparatively poor honey district, such as mine is, a swarm should contain about six pounds of bees in order to be able to labor to most advantage. Some important particulars also require to be taken into consideration, when bees are to be weighed. Those with which I experimented were taken from clusters hanging outside of their respective hives, and may be supposed to have had comparatively little honey in their stomachs. One hundred and seventy-seven of them weighed half an ounce—being at the rate of five thousand to the pound. When about to swarm, bees naturally or instinctively gorge themselves with honey; and at such times one hundred and twenty-five would probably weigh half an ounce, or four thousand to the pound.—BERLEPSCH.

EGGS OF THE BEE MOTH.

The eggs of the bee moth are entirely round and very small, being only about the $\frac{1}{8}$ of a line in diameter. In the oviducts they are ranged together somewhat in the form of a rosary. They are not developed successively like those of the queen bee, but are found fully formed in the ducts, a few days after the moth emerges from her cocoon. The female deposits them in small parcels or clusters on the combs. If any one desires to witness the discharge of eggs, he need only seize by the head a female two or three days old, holding it between his finger and thumb. She will instantly protrude her ovipositor, and the eggs may be seen passing along the semi-transparent duct.

That the moth does not deposit her eggs in the pollen of flowers, as some imagine, but on the combs in the hive, is very certain. I have repeatedly found little clusters of eggs on combs which I removed out of hives.—DR. DÖRRHOFF.

Early Spring Treatment, IN POORER DISTRICTS.

Theoretical bee culture is precise, definite, uniform, consistent, and uncompromising. *Practical* bee culture, on the other hand, must be regulated or modified by circumstances. It is hence, pliant and accommodating; adapts itself to the particular location and surroundings of the beekeeper, and varies its plans and processes accordingly. The system which is advantageous and suitable in one section of a country, may be largely inapplicable and decidedly disadvantageous in another, though all the while the fundamental theory remains unchanged and unchangeable. My present purpose is not to discuss the theory, but to suggest modes of practice such as may prove generally serviceable in almost any locality. And as I design my remarks more particularly for the benefit of *beginners*, I propose to keep *their* wants steadily in view. Experienced beekeepers will please bear this in mind, should they do me the honor to peruse these articles, and fancy that there is too much of detail on some points, too much brevity on others, or that some topics have been altogether omitted. Let them kindly remember my special object; and if I occasionally adduce facts without submitting the proof, let them consider, that for the present, I assume that beginners will repose confidence in my fairness. Submitting all my statements to free discussion, I may, hereafter, if necessary, either demonstrate their truth, or retract whatever is found to be erroneous.

I proceed to treat of the management of bees from the close of winter to the end of April:

1. IN COMMON HIVES.

If, as should invariably be done, only populous and well-provisioned colonies have been selected for wintering, and these have been properly sheltered during the cold weather, and kept undisturbed, without being deprived of adequate supplies of pure air, the bees will come forth healthy and active, on mild days at the approach of spring. Their owner can rely confidently on the hardiness of the insect, and has no reason to apprehend an untoward result, except the occasional loss of a queen, if his hives contain such as are old or feeble. I shall, on a future occasion, discuss fully the important subject of wintering bees, and will merely remark that I pre-suppose that every beekeeper winters his stocks in a dark chamber or vault; or if he allows them to remain on their summer stands, he protects them, by screens, from the rays of the sun.

Nothing is more injurious than to expose them to the sun's action during the winter months.

As soon after the middle of February as the thermometer, on a bright, calm day, marks 46° Fah. in the shade, remove the screens, or bring out the hives from their winter depository, and allow them to fly. By prolonged confinement their intestines have become surcharged with fecal matter, and if prevented from flying on the first suitable occasion, they may be constrained to discharge it in the hive, soiling alike themselves and their combs, besides diffusing an offensive odor which may cause disease. Still it is needless to be over anxious about the matter, since it is ascertained that, if kept undisturbed, they can bear four months' confinement without inconvenience. If they were placed in a vault or dark chamber, Dzierzon recommends replacing them there in the evening, because at this early period they are still unable to gather supplies, and large numbers would perish in their excursions in quest of water and pollen. I shall not absolutely reject this counsel, but merely state that I do not myself follow it. I would not deprive myself of the pleasure of hearing the joyful hum of my bees and witnessing their activity in gathering pollen, though the loss were even greater than I ever found it to be. Many bees will still be lost on the cold days in April—nay, I fancy that ten-fold as many perish during the variable weather of that month, when the temptations to venture forth are so much more frequent. On the cold and stormy days in March the bees remain more contentedly at home than they do in April, when, if pasturage occur, they will hurry forth to appropriate it, though thousands drop chilled should the sun be suddenly obscured by clouds. I have known hundreds, laden with pollen, drop and die in front of my apiary, even in May, when a sudden change of temperature took place. The careful apiarian will always gather the chilled bees, and when revived, add them to his weaker stocks, by which they will be kindly received, if they were first slightly sprinkled with diluted honey. The greater number will probably afterwards return to their own hives; but some will remain, and weak stocks may thus be materially strengthened.

If the stocks were wintered in a special depository, each should, on bringing them out, be placed in its former location on the summer stand. They do not, in the course of four months, totally forget where their homestead stood; and by an inadvertent transposition, some may become greatly weakened and others unduly strengthened. Advantage may, however, be taken of this opportunity to reinforce weak colonies, by interchanging them

with such as can spare a portion of their population. Bees rarely attack each other on such occasions at this season; but if they become quarrelsome, a few whiffs of smoke will soon pacify them.

It is advantageous to change the bottom boards as soon as the weather becomes moderate, and *before the bees begin to fly*—removing all dead bees and other droppings collected there during their confinement. This will save them much labor, and preserve many bees; for they manage the business of carrying out their dead rather awkwardly, being apt to fall with them on the snow or cold ground, and there becoming chilled. In cleansing the bottom boards, it is best to begin at one end of a row of hives, giving the first a new board, and after cleansing the one removed, substituting it for that of the second, and so on. The operation should be performed as expeditiously as possible, and without noise; and it is, therefore, well to have an assistant to lift the hives gently as the boards are changed. If the hives stand so far apart that a bottom board may be set between them, the hive to be operated on should be quietly lifted and at once placed on the board intended for it. This involves less labor, and the bees are less disturbed, as the hive with its new board may be quickly replaced on its former stand. Expedition in this work is the more important, for if once the bees begin to fly it becomes difficult to transfer the hives without crushing many. If the hives have remained on their summer stand, the bottom board should be changed before the screens are removed; and if they were kept in a depository the change may be made just before bringing them out, unless they were set inverted during the winter. The bees are apt to become aroused while the hives are carried out, and crowd down on the bottom boards, especially in populous colonies.

After the bees have ceased to fly, on the afternoon of the day they were brought out, each hive should be closely observed, to see whether any of them show symptoms of queenlessness. If any colony continues to be restless or in commotion till evening; if after the day's labor is ended, the bees still issue in numbers, and run confusedly over the front and sides, as if in anxious search of something; if they fly off and quickly return again, issuing and entering in eager haste, there is every reason to conclude that such hive has lost its queen. And if within the hive a peculiar melancholy, occasionally intermitted wailing hum is heard among the workers, their destitute condition is conclusively announced. There is an unmistakable difference between these sounds and those emanating from a colony possessing a queen,

though it is difficult to give a beginner an intelligible description of the wail. A correct knowledge of it can only be derived from hearing it; and once heard it is not likely ever to be forgotten. While I kept bees in common hives, I used in the evening of the day on which the bees made their first or purifying flight, tap gently on each hive with my finger, placing my ear against the side at the same time. Those colonies which responded promptly, and briskly, with a general hum, at once relapsing into silence, were passed as in good order; while those which uttered a languid, plaintive tone, were marked as probably queenless, and in nine cases out of ten they proved to be so. Even colonies containing barren or drone-producing queens, will sometimes utter these plaintive sounds; and those having queens entirely sterile will do so pretty uniformly; not indeed on the day of their purifying flight, but usually on the first mild day thereafter, when the weather permits the workers to fly out and gather pollen. On such occasions, colonies having sterile queens will deport themselves just like those which are queenless. I attribute this to the newly-awakened desire for brood, which the workers then feel; and in the case of drone-producing queens, though the plaintive tones are less uniformly heard, the workers appear to have become conscious that the brood they are nursing is not of the kind required for the prosperity of the colony. Those who use straw or box hives, will do well to test their stocks in the manner mentioned, on the evening of some mild day after the cleansing, when the bees are able to fly.

While still using common hives, I found it advantageous, when the colony was populous, to have two entrances during the winter—one at the bottom and another higher up, near the middle of the front. I adopted this plan on finding that strong colonies are rather inadequately supplied with pure air, when the hive has an entrance at the base only. (In movable comb hives, the case is different. These should never have more than one entrance, because in them the influx of pure air, during winter, may be otherwise secured.) In the spring, however, only one entrance should remain open, and that must be at the base. In weak colonies, the entrance should be kept small, to prevent the attacks of robbing-bees, and to retain the internal heat, so that brooding may be duly fostered. The upper entrance should be closed, and the lower one contracted, on the day after the cleansing.

On the day of the cleansing, or certainly on the following day, if mild, the workers will issue in quest of pollen and water for the brood. But as

there are few flowers in bloom at this early period, they make many bootless excursions, and numbers perish. It is, therefore, advisable to furnish them with rye-flour or oat-meal, which are excellent substitutes for pollen. Water, somewhat sweetened with sugar at first, may be placed for them in some warm, sheltered place, convenient to the apiary, but a few rods distant. The meal may be sifted lightly into the cells of old drone comb, or placed in a shallow trough or box. The water should be in earthen ware dishes, and some moss, or pieces of clean sponge may be dropped in it, to save the bees from drowning. By previously offering them some honey on the spot where it is intended to place the flour and water, the bees may readily be trained to resort thither for supplies. They will carry in flour or meal only so long as they cannot find pollen, and it is useless to offer it to them afterwards; but they should be regularly supplied with water till the spring is fully open, and they are gathering honey plentifully.

All writers on bee culture, concur in advising that only strong colonies, which need no feeding, be wintered; and I have given the same counsel. No doubt this is excellent advice; but will probably be of as little service to beginners, as that of the old lady to her son, not to go into the water till he had learned to swim. *Beginners*, rarely have strong and well-supplied colonies in the fall, and are constrained to winter such as they have, or none at all; and it will frequently happen that by the middle of March, their stocks have consumed their stores, and are in a state of destitution. What is to be done in such cases? The teachers say:—"give them plenty of honey, especially in sealed combs." But beginners usually have no honey, either in combs or cans, and are compelled to buy such as they can get. Cuban honey is commonly resorted to as the best and cheapest substitute, and is simply diluted with water, poured into some shallow vessel provided with a float, and set within the hive on the bottom board. This is a decidedly bad mode of feeding, because it is *unsuitable, dangerous, and expensive*.

It is *unsuitable*, because the sole object of feeding, at that time, is to give the bees just such supplies as their own necessities and the wants of the existing brood require. But, by feeding diluted honey the bees are tempted to lavish consumption, and stimulated to increase their brood inordinately. They are, as Ehrenfels expresses it, induced to "imagine that nature furnishes what man supplies." Much honey is thus misappropriated, as the brood requires quite a large amount for its healthy development. This

might still be well enough, if the population were correspondingly increased—whereas the contrary is more frequently the result. The superabundance of brood constrains the bees to make reiterated excursions, partly to procure pollen and water, and partly to discharge their feces. Hence during the rough and cold weather, more bees are lost than the emerging brood supplies. In short, experience teaches that a strong increase of brood in March, superinduced by supplies of diluted honey, is decidedly disadvantageous and useless.

Such feeding is *dangerous* likewise, as it exposes the colony to be attacked by robbing-bees; and if the honey be impure or possess noxious qualities, it may introduce disease. These dangers may be avoided by the use of sugar-candy, which is an article undoubtedly better adapted in every way for winter or spring feeding, than diluted honey. The simplest mode of supplying bees in common hives with this food, is to cut a hole about three inches in diameter, in the top of the hive; then take four pieces of board, four inches square, and nail them together, so as to form a small box without top or bottom; set this over the hole in the top of the hive, closing the interstices between hive and box with damp clay. Now fill the box with lumps of candy, cover it with a piece of coarse linen, place a close-fitting board on it, and secure it by a weight to prevent it from being blown off. The bees will enter and supply themselves according to their wants, and more candy may be given to them when needed. If the beekeeper has or can procure some old thickened honey, which may be cut with a knife, like butter, he may use it instead of candy. It will answer nearly as well, though more of it will be required, as it is more readily soluble.

Feeding with liquid honey is also *expensive*. It has been found on trial that it costs fully three times as much as the candy which would be required. The latter is consequently much the cheaper article, and the former should not be used when it can be avoided. Nor should bees ever be fed *from below*, unless the population be so reduced and weak that it could not well avail itself of supplies placed above. Absolute necessity is the only excuse admissible for feeding below, when the object is to save a colony from starvation.

I may add that there is a great difference in the quality of candies. The amber-colored semi-transparent kind, prepared for domestic use, is the least suitable for bee-feed. The cheaper brownish-colored is to be preferred, as being more easily and more perfectly soluble, and hence attended with less waste.

On a clear mild day, about the middle of March,

all the colonies should be thoroughly re-examined, to ascertain whether they have healthy fertile queens, the evidence of which is the existence of capped brood in worker cells. If any of the worker cells are somewhat elongated and sealed with prominent convex caps, they contain drone larvæ. If such cells are numerous, they show that the queen has lost, or is beginning to lose, her ability to lay worker-eggs; or, if no queen be present, that they are laid by a fertile worker. An easy mode of ascertaining the internal condition of a common hive, is to blow in a few whiffs of segar smoke through the entrance; then gently raising it and puffing in a few more whiffs among the combs. The hive may then be taken from its stand, inverted and placed obliquely on the ground to allow the sun's light to fall between the ranges of comb. If no worker-brood is then to be seen, the hive should be marked as suspicious, and examined again a week or ten days later. When a hive is removed, the droppings on the bottom board should be carefully scrutinized. If partially mature worker-larvæ be found there, further search is needless, as the hive has a fertile queen.

Weak colonies, and such as are suspected of being queenless, should be carefully watched. The entrance should be diminished in size, to permit only one bee to pass at a time. This is useful to prevent incipient robbing, and it is much easier thus to prevent attack, than to arrest it when once seriously made. I shall, hereafter, take occasion to discuss this topic more at large, and content myself at present with advising that weak colonies which have been repeatedly attacked, be broken up—reserving the good clean comb for future use, in movable comb hives, and uniting the bees with those of some other stock, after sprinkling them with sugar-water to procure them a kind reception. If any brood is found, cut out the comb containing it, and insert it between the combs of some other colony, where it may be duly cared for.

Some writers recommend transposing weak colonies which have a healthy queen, with some populous one in the same apiary. I tried this experiment years ago, and found that it produced no real advantage, at least when resorted to in March or April. The strong stocks were invariably much more injured than the weak were benefited by the process.

Colonies found to be queenless or drone-brooding before the middle of April, should forthwith be broken up. The insertion of worker-eggs or brood in such colonies, to enable them to rear a queen, is sheer waste of time. It may be useful after the middle of April, if the colony is populous, but only when that is the case. It may

occasionally, though rarely, prove successful with a drone-brooding stock; but it is difficult to decide whether it is ever of any real service. I am inclined to think that it is not.

2. IN MOVABLE COMB HIVES.

During the period under consideration, the management of movable comb hives is not *essentially* different from that of common hives, save in two respects—and these are precisely those which clearly exhibit the superiority of such hives. They are of themselves sufficient to induce any intelligent beekeeper to introduce them in his apiary, and will finally lead him to the gradual disuse of every other kind.

In the first place, movable frame hives enable the beekeeper to ascertain the exact condition of his stock at any time. He can know certainly whether a queen is present or not, and whether she is healthy and vigorous, by simply lifting out the frames and inspecting the combs.

In the second place, weak colonies can be readily reinforced by means of combs containing sealed brood, taken from time to time from strong stocks, and inserted with all their adhering bees. With reasonable attention and little trouble, all the stocks in an apiary may thus be brought into good working condition before the end of April. This alone is a highly important advantage. And yet beginners must be cautioned against availing themselves of the process in hot haste and with overweening confidence. If it is not to do more harm than good, a thorough acquaintance with the internal economy of colonies is an indispensable pre-requisite; and this is precisely what *beginners* are most deficient in and least conscious of. They should experiment in this way very moderately, and content themselves with a small increase, till practice and experience enable them to operate on a larger scale.

Stock should be treated in the manner directed till the end of April. All needless disturbances should be avoided. At this season bees still require repose.

Some of my readers may think that I have omitted to notice one important item, namely, the *pruning* of stocks, which is usually done about the time when gooseberry bushes are in blossom, and is regarded as of the utmost consequence. I, too, consider it a matter of vital importance, involving the *ruin of bee-culture in poor districts*, as I shall endeavor to show in a future article.

A. B.

"In good honey years, every bean-pole sweats honey."—*German Proverb.*

Honey Districts.

In *poor* honey districts, that is, in such as have bee pasturage only in spring and the early part of summer till about the first of July, and where bees have no opportunity to forage on later crops, such as buckwheat, or from wild fall flowers, the endeavor of the beekeeper must be, by keeping only populous colonies, to enable his bees to secure their year's supply of stores early in the season. In other words, he must have them in a position to do as the farmers do—"make hay while the sun shines." He should also refrain entirely from *pruning* his stocks in the spring; or at most pare away from the combs, in his old-fashioned hives, only so much as is absolutely necessary to remove the *droppings* which have accumulated on the bottom boards during winter—cutting away not more from the combs than will suffice to allow the bees a free passage below. If he uses movable frames, and some of the combs remain still full of sealed honey when the gathering season has fully come, he may remove them; but should, if possible, insert frames with empty comb instead. He should likewise, if practicable, supply with empty *worker* comb the hives in which he placed his first swarms, and all his earliest-made artificial colonies. His bees will then be in a condition to labor unremittingly, and will sedulously avail themselves of every opportunity to appropriate the supplies which nature then dispenses with a lavish hand. When this has been accomplished, and pasturage begins to be less abundant, the proper time for encouraging comb-building has arrived. The full and sealed combs should now be removed from the honey chambers, and combs containing sealed brood may be transferred to strengthen weak stocks. Colonies which begin to remit their exertions and appear to contemplate swarming, will, by such transfer, be induced to commence building combs, and be constrained to postpone swarming indefinitely. Old and young will co-operate energetically, and the vacuum resulting from the removal or transfer of combs, will speedily be filled. Early and extensive pruning would have operated disadvantageously, by depriving the bees of empty cells needed for storing honey, and compelling them to build comb at a time when they should be employed in gathering nectar from every opening flower. Matters should be so managed as to have the comb-building deferred till the period when swarms usually issue. *He, who in POOR HONEY DISTRICTS, prunes freely in early spring, will usually find empty combs, and no surplus honey, as the result of his management.*

But in *rich* honey districts, such as furnish only moderate pasturage in spring and the earlier part of summer, but an abundance of it in the latter part of the summer and in the fall, a different policy should be pursued. There the bees should be induced to do their comb-building *in the spring* and early part of summer; and there *spring pruning* is in place, if it be not done too early. Just before the season fairly opens, and the bees begin to gather, is the proper time. Brooding will not then be seriously interfered with, because the extended space already occupied by the brood will necessarily restrict the pruning within legitimate bounds; and at such times, and under such circumstances, comb-building proceeds rapidly, and the now daily emerging young, furnish empty cells nearly or quite as fast as the queen requires them. The queen also is thus induced to deposit her eggs chiefly in the upper portions of the combs, from which the older stores of honey are now removed for the nourishment of the brood, and to supply with material those bees engaged in building comb. If swarming and the making of artificial colonies be somewhat delayed by this mode of management, no harm results; for there is yet "a good time coming" in districts where the chief honey harvest occurs in the latter part of summer and in autumn. Yet it is advisable, even in such districts, to furnish swarms and young colonies with an ample stock of empty combs when practicable, that they may speedily become populous and be prepared to gather abundantly when nature opens her exuberant fountains. To this end, every piece of good clean *worker* comb should be preserved at the spring prunings, and employed to lighten the labors of the bees at this more busy season. If thus managed, the colonies will be in a condition to work to advantage while fall pasturage abounds, and honey will be rapidly stored up. He who in *such* districts *does not* prune his hives at the proper time in spring, and preserve his good combs for future use, will find in autumn that his bees will remain comparatively idle for want of room to garner what they might gather. The combs will be filled with brood, and when the season ends, little provision will have been made for the coming winter.

I will illustrate what I have said by some striking examples—premising that I reside in a *poor* honey district.

1. In 1857, I persuaded one of my neighbors to allow one of his straw hives to remain unpruned in the spring, except for the removal of droppings. It produced a large early swarm and thirty-six lbs. of surplus honey. In 1858, which was with us

a better honey year than its predecessor, the same hive was pruned on the 15th of April, and about half a lb. of wax removed, at the urgent request of the owner. The product was one weak late swarm and no honey. The swarm, with all the comb it built, was not worth a dollar on the first of August. The comparative result was—

1857, One Swarm, worth	\$2 50
36 lbs. Honey, at 15 cts.	5 56
	———— \$8 06
1858, One Swarm, worth	\$1 00
½ lb. Wax,	16
	———— 1 16
Difference,	\$6 90

Which is equivalent to 46 lbs. of honey.

2. Standing near the straw hive, in the same apiary, was a box hive, which was left unpruned.

It produced in 1858,

34 lbs. honey, at 15 cts.	\$5 10
The straw hive produced	1 16

Difference, \$3 94

Which is equivalent nearly to 26½ lbs. of honey.

3. On the 28th of April, 1858, I pruned from one of my box hives ¾ lbs. of wax, and from another 1½ lbs. Two others in the same apiary, and of the same size and quality, were left unpruned.

The latter two yielded,

Two swarms, worth	\$5 00
40 lbs. of honey, at 15 cts.	6 00
	———— \$11 00

The former two yielded,

30 lbs. of honey, at 15 cts.	\$4 50
2 lbs. of wax, at 32 cts.	64
	———— 5 14

Difference, \$5 86

Which is about equivalent to 39 lbs. of honey.

Hence, in these instances, the cost of producing a pound of wax and one very weak swarm, was—

Example 1, - -	46 lbs. of honey.
" 2, - -	26½ " "
" 3, - -	19½ " "
	3) 91½

On the average, = 30½ lbs. of honey.

The Baron of Berlepsch notes it as a singular fact, that *young queens just beginning to lay*, and old queens *just recommencing to lay in the spring*, not unfrequently deposit drone-eggs in worker-cells, without subsequently showing any evidence of practical derangement. This exceptional drone-egg laying seems to be merely the result of some transient irregularity.

CHEMICAL ANALYSIS OF THE ROYAL JELLY.

BY DR. DÖNHOF.

The royal jelly, with which embryo queen-bees are fed, contains animal albumen and fibrine. At least nine-tenths of the mass consists of these. This is evident from the following tests:

1. If the jelly be treated with ether and water, the pure substance alone will remain. This is whitish, translucent, and elastic, having all the appearance of coagulated albumen and fibrine.

2. If the jelly dries up in a royal cell, (as is the case particularly in queenless and drone-producing colonies, where the bees undertake to rear a queen from a drone larva which invariably perishes in the process,) it becomes transformed into a tough, yellow, transparent mass, like that into which protein substances are converted.

3. If the wax and sugar be extracted from the jelly by ether and water, and a solution of sulphate of copper be added to the residuum, oxide of copper will be precipitated by caustic potash; but the solution will retain the blue color of the salt.

4. The mass remaining after treating the jelly with ether and water will be completely dissolved by a solution of caustic potash, assuming a faint yellow tinge, and on the addition of muriatic acid will emit an odor resembling that of sulphuretted hydrogen.

Ingredients present in minute quantities only, are:

1. *Wax*. When I treated the jelly with ether, there remained on evaporation by heat, a white mass having an unctuous feel, and which, when warmed, rendered paper transparent and glossy.

2. *Sugar*. When the jelly was digested in water holding sulphate of copper in solution, the addition of caustic potash produced a brownish-yellow precipitate.

3. No trace of pollen or starch could be detected, by employing the usual re-agents.

The presence of albumen and fibrine shows that the jelly is an animal secretion, and should be designated by some more appropriate name.

It seems probable that the secretion is effected by a gland in the gullet or esophagus, since jelly is never found in the stomach of the bee.

Artificial colonies are more apt to succeed well or thrive, if the bees of which they are composed are taken from different hives. The queen and a few hundred bees may be taken from one hive, and the rest of the workers required, from two or three others; and the new colony thus constituted should be sent to a distant stand, at least a mile and a half or two miles from the old apiary.

Bee Culture in Greece.

Bee culture is a source of very considerable private revenue among the modern Greeks. Indigenous aromatic plants abound in the mountainous portions of the country; and to them, doubtless, is to be attributed much of the excellence for which Grecian honey is celebrated.

The Attic hives are of a peculiar construction. They are formed of clay, glazed and burnt like common earthenware. Their form is cylindrical. They are from three to four feet high, and from twelve to eighteen inches in diameter; and have a movable top. They are usually placed with the entrance facing the east or the west, as the bees suffer from the cold northerly winds of the country. To protect them from the rays of the sun, they are shaded in summer by the foliage of vines and climbing-plants, cultivated and trained for that purpose. They are sometimes arranged in rows against a wall, or under the shelter of a hedge; and occasionally we find an apiary covered with a substantial roof. Unfrequented and secluded spots are generally selected, such as the ruins of churches and deserted cloisters, in the vicinity of brooks and streamlets; and shallow ditches are sometimes dug to convey water near the apiary, and strips of boards or other timber are placed therein for the bees to alight on.

Artificial multiplication of stocks is sometimes resorted to, and executed in a rude manner. For this purpose several pieces of comb containing honey and brood are cut out and inserted in one of the above-described hives, which is then placed on the spot from which a populous colony has been removed. The exterior of the hive is rubbed with balm leaves to make it more acceptable to the returning bees, which take possession of it and rear a queen from the brood it contains. Natural swarms, when they cluster in a favorable location, are usually secured in a swarming net or bag, preparatory to hiving, and subsequently transferred to a hive when all the arrangements requisite have been completed. When a swarm settles in a spot not readily accessible, it is dislodged by the use of smoke, and when practicable driven into the swarming net. It is customary to unite two or more weak colonies, since it has been found by experiment that while a colony of four thousand bees will yield only eight pounds of honey, one of eight thousand will yield twenty-four pounds—double the number of bees producing nearly four times the amount of honey.

In Greece, bees swarm three or four times in the course of the season; but only first swarms are certain to thrive. The latter ones being weak,

and having a brief period of good pasturage in which to labor, can not gather stores sufficient to enable them to pass the winter in good condition, and many perish of hunger.

The honey harvest takes place in September and October, at which time as many of the combs containing honey are cut out as it is thought the bees can spare.—These combs are drained of their contents by placing them in dishes exposed to the sun; thus separating the honey from the wax, without employing artificial means.

To enable the bees to economize their stores during the winter, the stocks are not unusually carried into a dark room where a low temperature prevails, and kept there till the return of spring. This is the customary mode of wintering bees in Mesopotamia, and on the island of Poros.

The best honey provided in Greece is that of Mount Hymettus, so highly extolled by ancient writers, and deemed not less worthy of praise by those of later dates. Next in favor ranks the honey of the Pentelikon, and then follows that of the isles. A very peculiar kind of honey is produced at Kargetos, in the island of Euboa. In a wild uncultivated district near that city, there are extensive tracks overgrown with raspberries, dog-roses, and oleanders, furnishing the bees with a superabundance of most excellent pasturage. This honey has a delightful flavor of roses, and was in special repute and demand under Turkish regime. The resident Pasha then claimed a monopoly of this delicious product, and annually sent the choicest of it to Constantinople, as a present to the Sultan; nor was it allowed to be sold to others under the penalty of death.

In favorable years, 40,000 oca of honey are exported from Greece, principally to Trieste, Marseilles, Leghorn, and Malta; and about 400 cwt. of wax are sent annually to Trieste and Marseilles. In Greece, wax is generally used in its unbleached state, in the manufacture of tapers.—DR. KLAGES.

CHILLED BEES.

In the month of March, Capt. Balenstein gathered from the snow on which they had fallen, a large number of chilled and apparently dead bees. He laid them on the alighting board of one of his hives in the evening, and closed up the apiary. On re-opening it next morning, at 10 o'clock, they still lay there without any sign of life. But after the sun shone on them awhile, the greater part of them revived, and flew to their respective hives. They had remained in a benumbed state sixteen hours without being really killed.

SWARMING AND HIVING.

To attract and arrest natural swarms when issuing, and be able to hive them more conveniently, I remove the bottom boards from several of my most thriving and populous colonies, replacing them by extra boards kept for the purpose. To each of the removed boards I fix three hooks in such a manner that each board may be suspended horizontally by cords from the limb of a tree, with the side which was next to the bees turned towards the ground. I drop some melted wax on the side which will thus be undermost, and attach to it a small piece of clean comb. When the swarming season approaches, I suspend the boards thus prepared under a tree or trees twenty or thirty feet from the front of my apiary, and five or six feet from the ground. I find that the swarms which issue will almost uniformly cluster under these boards. When the bees have become settled, the board is lowered gently, and the swarm hived. The board is immediately suspended again to attract any stragglers flying about, which are afterwards carried to their companions in the hive. On very warm days, swarms are inclined to rise higher than usual, and to provide for such a contingency, it is well to suspend one of the boards at a greater elevation than the others. I have successfully used this method more than ten years, and can recommend it to those who still permit natural swarming.—J. HILDEBRAND.

QUICK WORK.

The rapidity with which bees will build comb and gather honey, under favorable circumstances, is so extraordinary as to be almost incredible. Mr. Brink says, that he has known a strong swarm to fill its hive with comb in seventy-two hours; and that colonies expelled in August, put into empty hives, and transported to the heaths, would fill the hive with new comb and gather from thirty to forty pounds of honey, in the brief season for work in which they could labor. In the spring of 1853, one of his neighbors carried his stocks, whose stores were nearly exhausted, to a distant rape field then in blossom. The weather was raw and unfavorable at the time, but suddenly changed, becoming mild and clear. The bees labored so successfully, that after a few days his neighbor called on him for advice, saying that the liquid honey was running in streams from the hives. On examination it appeared that all the combs were filled to overflowing, in consequence of the superabundance of nectar supplied by the rape blossoms, and the indefatigable industry of the bees in gathering it. The soil on which the rape grew was a calcareous marl.

BROOD A STIMULANT.

On the 1st of July, a second swarm issued from one of my hives. On examining it on the 10th, I found that no eggs had been laid, and inferred that the queen had not yet been fecundated. In order to strengthen the stock, and possibly encourage it to labor more industriously, I inserted a small piece of comb containing worker-brood, but no honey. This was done at four o'clock in the afternoon, and within thirty minutes after, my attention was attracted by the busy and seemingly joyous flight of the bees. At five o'clock I saw the queen returning to the hive from an excursion. On the following day I neither saw her issue nor return, and on the evening of the 12th, I discovered that she had commenced laying eggs. Suspecting that the insertion of the brood had incited her to issue, as she came forth so soon after, I was induced to try the experiment with two other after-swarms. I inserted brood comb in each of them, on the fourth day after they were hived. Three days thereafter, one of the queens proved to be fertile, the other was lost. I supplied her place by a young queen just hatched, which began to lay on the morning of the fourth day after she was put in the hive. J. G.

RED CLOVER.

When it happens that bees cannot gather honey from other sources, while the red clover is in blossom, bees will occasionally resort to this plant for supplies. But they find it difficult to accomplish their object, because the tube of the blossom is so long and narrow, that they cannot reach the nectaries in the usual manner. They can only gain access to them through a slit in the tube, situated between the calyx and the corolla. The tube has only two such slits, and the bees are not always successful in their efforts to extract the nectar through them. The humble bees, having the advantage of a longer proboscis, readily reach the nectar through the mouth of the tube. The blossoms of white clover, as well as those of white and yellow mellilot, have short tubes; and the bees encounter no difficulty in extracting honey from them.

REV. MR. KLEINE says, that on examining the wings of Italian and common bees with a microscope, he could perceive no difference of size; but that the nervures, particularly of the radial cells, are more delicate and beautiful. He does not think that the bodies of Italian bees are normally smaller than those of common bees, nor that there is an appreciable difference in their average weight.



The Drone Bee.

We now proceed to notice the drones, which are bees of larger size, stouter, and more squarely built, than the workers. They commonly make their appearance in the hives in April, May and June; and are usually expelled from the colonies, by summary process, in July or August. The head of the drone is more spherical than that of the worker, the body is more bulky and hirsute, and the abdomen terminates more obtusely. They fly more heavily and make louder humming when on the wing. But their apparently most distinguishing characteristic is the want a sting, which constitutes the formidable weapon of the worker, and with which even the queen is armed.

Singularly discrepant and contradictory opinions respecting the sex and functions of this kind of bee have been entertained by eminent apirians, and are still cherished and advocated by recent writers. Some, indeed, go so far as to refuse to acknowledge them to be natural and necessary members of the busy commonwealth, regarding them rather as misbegotten monsters or parasitical intruders. Such extravagant notions scarcely deserve notice, otherwise than as curious vagaries not seriously requiring refutation. The workers build the cells in which the drones are bred; and the queen, in healthy colonies, lays the eggs from which they are hatched. They and the workers are the offspring of the same mother, and have an equal claim to be regarded as constituent members of the community.

But, conceding their rank and equality, of what sex are they, and what is the design of their brief and monotonous existence? Are they substantive elements, or mere adjuncts, like the transitory sepals of a blossom?

Some regard the drones as *neuters*, designed merely to generate and maintain in the hive the requisite degree of heat, during the brooding season, when a large majority of the workers may be abroad busily engaged in gathering in their harvest. They accordingly call them *brooding-bees*, and contend that the production of heat is their exclusive vocation. No plausible reason can be assigned in support of this notion. At the period precisely when the drones are most numerous in a hive, it contains the smallest amount of brood.

When the old and fertile queen leaves with the first swarm, comparatively few drones have been hatched, unless swarming was delayed by unfavorable weather. Yet, with the departure of the queen, egg-laying ceases and the brood diminishes from day to day. Then, when in the course of three or four weeks, the young queen having become fertile, brooding has recommenced, and is vigorously prosecuted, and there might seem to be occasion for their services were they brood-bees, the drones are suddenly expelled, as useless supernumeraries. Does not this clearly show the absurdity of the notion?

But, since the worker-eggs are susceptible of development as queens, and are hence unquestionably females, does not the strikingly different organization of the drones of itself warrant the conjecture that they are males? And that which may thus be fairly inferred, has been demonstrated to be true by dissection, which proves that they possess male organs of generation. It is, moreover, confirmed by the experience of practical beekeepers, that a young queen prevented from having concourse with a drone, or bred early in the spring before drones have made their appearance, remains sterile; and that in years when few drones are produced, many young queens remain barren, and others become fertile only after making repeated excursions. This not only shows that the drones are the males, but that the fecundation of the queens would not be certainly effected, did the drones not exist in great numbers at the proper period. Queens have been observed to make excursions daily for three weeks before they commenced to lay, at a time when but thirty or forty drones could be found in the apiary; yet subsequently, when the latter could be counted by hundreds, all the young queens were fertilized and commenced laying within a week after they emerged. Drones being designed to fecundate the queens, and that being feasible only on the wing, they leave their hives at about noon on every fine day; and the young queens invariably make their excursions soon after. Without them, the queens would remain barren, and the race could not be perpetuated. This is the sole purpose of their existence.

Strong colonies alone and such as, in the consciousness of increasing numbers, contemplate swarming, produce drones. After the swarm has departed, and when the young queens are making their nuptial excursions, the drones are always most numerous. True, a colony which does not swarm, or rears no queens, would have no occasion for drones. But as the contingencies which may prevent swarming cannot be foreseen, drones

are nevertheless produced, because in the event of being wanted they could not be suddenly bred. Hence the objection that non-swarming colonies ought not to rear drones, is about equivalent to arguing that a tree should not have blossomed because a frost destroys the fruit.

Drones might much more appropriately be called swarm-bees, because their appearance is always in so far connected with natural swarming, as it is an evidence of that strength and vigor in a colony, which alone justify the expectation that a swarm may issue. Ordinarily no colony sends forth a swarm unless it has drones, or drone-brood in process of hatching. And neither the new queen retained in the parent hive, nor any of the queens of second and later swarms could be fecundated, if nature had not made provision therefor by the contemporaneous production of drones. The young queens might, indeed, be fecundated by drones from some other colony. But nature could not trust to chance, and always provides for each swarm whatever is requisite in this respect, for its independent existence. As the young queens of second and later swarms make their excursions from the locality which these have selected, or in which the new hives are placed, they always contain a greater proportional number of drones than accompany first swarms, and most of these have emerged after the first swarm left.

Those who ascribe to drones some secondary use or purpose, usually refer to the great number produced as indicating the correctness of their views. "Why," say they, "are hundreds or thousands of drones bred, if a single one is sufficient to fecundate the queen?" But, from what has already been stated, the great uncertainty which attends the fecundation of a queen is obvious, or she would not when drones are scarce, have to make repeated excursions, and incur the numerous risks attending them. A great multitude is indispensable to diminish risk, and prevent delay. The drones do not and cannot all leave the hive at the same time, and natural swarming so divides and subdivides their number, that ultimately each swarm has not more than an adequate supply.

An undue proportion of drones, however, is the result of improper management or of an unnatural condition of the colony. When a first swarm issues seasonably and is placed in a hive of suitable dimensions, such as it can fill with comb in a short time, comparatively little drone-comb is built; and a second swarm rarely builds any during the first season. But if the hive be inordinately large, or be prematurely enlarged in the ensuing spring—which is usually and almost unavoidably done by those who practise the *nadiring*

system—the bees are induced to fill most of the space with drone-comb. In process of time, under this system, the proportion of worker to drone-comb becomes completely reversed; and, as the cells condition the brood, a multitude of drones are reared, with comparatively few workers. But under an improved and rational system, which gives the apiarian complete control of the combs and the bees, such results can be effectually prevented, and the production of drones limited within such bounds as may be desirable. It is, accordingly, a great advantage to be able to remove the drone-combs out of the brooding chamber, and substitute worker-comb for them.

Bees are well aware that drones are absolutely indispensable in certain conditions of the colony. At the very time when, from want of pasturage and the unfavorable state of the weather, other colonies will destroy even the drone larvæ, those which are queenless and engaged in rearing queens will cherish their drone-brood as carefully as they do the royal cells. Hence, if for any special purpose, such as the fecundation of young Italian queens, we desire to preserve a stock of drones to the period at which ordinarily none exist, it is only necessary to remove the queen from a colony before the drones are expelled. They will then certainly be retained and fostered till the queens have emerged and are fecundated; and by a timely removal of the royal cells, the further preservation of the drones may be secured. Another decided proof of the importance which, in certain circumstances, attaches to the drones, is furnished by the fact that it is not safe, when endeavoring to rear queens artificially, to select for the purpose a comb containing both worker and drone-eggs and larvæ. The bees will be apt, in such case, to direct their chief attention to the drone-brood—at times even attempting to raise queens therefrom, by converting drone-cells into royal cells, instead of recurring to the worker-brood, as they otherwise would instinctively do. It is, therefore, best to furnish them with worker-eggs and larvæ exclusively at first, and introduce drone-larvæ only after the royal cells have been started on the worker-comb.

Queenless colonies retain their drones, in part because, though aware of their destitution, they still indulge a hope of being able to rear a queen, and in part because, in such a colony, a misguided spirit predominates—leading ultimately to dissolution and destruction. Some queenless colonies also will continue to produce drones long after they have been expelled from those supplied with queens. This well-authenticated fact led some apiarians to suppose that the queen does not

lay the drone-eggs, but that these proceed from a distinct kind of bees which they dignify with the title of drone-mothers. But to argue thus from what occurs in a diseased or abnormal colony, is as irrational as would be an attempt to infer the laws of mind from the idiosyncracies of the inmates of an asylum for the insane.

After the expulsion of the drones, the queen rarely, if ever, dies a natural death. If she did not perish from exhaustion when laying thousands of eggs daily, in the spring, she is not likely to do so later, when laying only a few hundreds. If she die casually when no drones exist, the colony may generally be regarded as doomed to speedy destruction. Even the rearing of a few drones will not always save it, unless the weather continues sufficiently mild to enable them to fly, and permit the young queen to make the indispensable excursions with success.

The long controversy respecting the origin of the drones, was conclusively settled only by the introduction of the Italian bee. It was found that on the removing the queen of a common colony, and substituting an Italian queen, all the drones subsequently produced, were of the Italian race, and that consequently the queen, in a healthy colony, lays both drone and worker-eggs. But though this is the case in every normally-constituted colony, it is equally certain that there are individuals among the workers capable of laying eggs, and which sometimes do so, on the death or removal of the queen. When this occurs, they are not unfrequently regarded and treated as queens by the workers; and if the colony be populous, it will, for a considerable period, show no evident symptoms of queenlessness. Their owner will not easily become aware of their true condition, unless he can inspect the combs, and see what kind of brood they contain. It is exceedingly difficult to restore or save such a colony. The workers are prone to neglect rearing a queen from worker-brood, when offered to them, and will even refuse to receive a fertile queen, if introduced among them. The better course is to break it up, and save the bees, by removing it to some other spot in the apiary, and setting a weak stock in its place. The returning workers, as they successively leave their old hive, will resort to this, and in a few days the fertile worker will be deserted by all but a few obstinate or devoted adherents. The queen of the substituted stock should be confined for a short time to insure her safety; and the combs of the deserted hive may then be cut out and reserved for use.

The refusal of queenless drone-breeding colonies to receive an offered fertile queen, shows

that the bees regard the fertile worker as their queen; and consequently, that two egg-layers, though one be a drone-mother, are not ordinarily tolerated. Sometimes, when worker-brood and larvæ is given them, and royal cells have been started, if a fertile worker begins to lay, the embryo queens will be summarily destroyed. Sometimes, too, the fertile worker will cease to lay when worker-brood is inserted and a royal cell started, remaining thus in abeyance; but will at once recommence if the royal cell or the emerged young queen is removed. These differences in deportment, perhaps result from the different degrees of development to which the fertile workers have attained, or their greater or less resemblance to a perfect queen enabling them to exert, accordingly, a greater or smaller amount of controlling influence over the workers. It seems probable, likewise, that there is always only one individual that actually lays eggs, though a greater number may be more or less qualified to do so; and that this actual laying suffices to secure for her a *quasi* respectful recognition as of queenly dignity.

There remains to be noticed another point, to which we shall advert only briefly on this occasion. Does the drone-egg require impregnation in order to become susceptible of development. Dzierzon maintained the negative, and his opponents the affirmative of this question. We need not here state the arguments used by either side in support of its opinion, because the matter has been settled by an appeal to facts. If drone-eggs do not need impregnation, then Italian queens must constantly produce Italian drones, and common queens common drones, though fecundated by drones of the opposite race. And such is the fact. The concurrent testimony of all observers, whose reports we have, is that Italian queens, fecundated by common drones, do invariably produce Italian drones, as fully and perfectly marked as, and in no respect different from, the drones produced by Italian queens fecundated by drones of their own race; and that a corresponding result occurs in the case of common queens fecundated by Italian drones.

Mr. ROSENMAN suggest that the disease called foul-brood, may be caused by nitrogen gas generated during the winter in a hive not properly ventilated, and insufficiently protected against cold.

It is a remarkable fact, that the indentations like those with which royal cells containing female larvæ are decked, as if for ornament, are never found on royal cells which contain drone larvæ

Peculiarities of the Royal Cell.

We are usually told that the embryo queen, on attaining maturity, liberates herself from the royal cell, on the 14th or 15th day, by piercing its cover or cap with her mandibles. All very true. Still it does not inform us *how* or *under what circumstances* this liberation takes place; and it is to these minutiae that I would now advert:

The young queen does not, unaided, work her way out of the cell. The workers are co-laborers on the occasion, evidently making the needed preparation for, and thus facilitating her enfranchisement. When the bees are constructing a royal cell, we do not find that its walls are, from the start, so thick and so indented or ornamented, as we see them subsequently. At first they are thin, and smooth on the exterior; but when the cell has reached its full length, the bees begin to thicken the walls and indent them externally.

On the 7th or 8th day, the larva being ready to undergo transformation, the workers close the cell with a slightly-convex cap or cover, rather delicate in structure, and as thin as those which are used to close worker or drone-cells. When this has been done, they proceed to thicken the walls of the cell-store more, using wax very lavishly for that purpose; at the same time deepening the indentations on its surface, so as to cause them to resemble rudimental worker-cells. This exterior thickening and ornamentation extends not only to the edge of the cap or cover, but considerably beyond, converging to an obtuse point and inclosing a hollow space. Thus two compartments are formed, the upper and larger of which is the original cell, and contains the embryo queen. The lower and smaller is empty, and appears to be intended to serve solely as a shield to the other. Its arched form enables it to resist external pressure more effectually, and thus protect the slightly convex cap of the true cell from casual injury, while the chrysalis is yet immature. If we take a royal cell a few days before the young queen is ready to emerge, and carefully dissect off this outer portion, the original and true cap or cover of the cell will be exposed to view; and on examination we shall find that it is entirely unconnected with the over-arching prolongation of the thickened cell walls.

When the embryo queen is nearly mature, within perhaps from 12 to 16 hours of the usual period of emerging, the bees begin to demolish this exterior compartment, reducing it to a level with the outer edge of the cap of the cell proper. Having reached that point, they smooth off the outer edges of the thickened cell walls in such a manner as that the

orifice of the cell, when the queen has emerged, shall be perfectly circular. The cap, owing to its convexity, is now somewhat prominent in the middle, and being withal very thin, is exceedingly liable to be injured or broken. To protect it, therefore, the bees coat it over with fresh layers of wax until it becomes nearly as thick as the cell walls. Having thus provided for the safety of the royal nursling, their coadjutory labors are ended and they withdraw.

In this condition of the royal cell, egress is no longer difficult. The young queen commences operations by piercing a hole through the edge of the cover with her mandibles, and then making a circular cut along its periphery. Being thus detached from the cell walls, it finally drops, opening a circular passage through which the queen emerges.

The annexed illustrations will probably render this account more intelligible.



Fig. 1. Represents the royal cell as originally constructed, with the exterior surface still smooth and free from indentations.

Fig. 2. Represents a finished and sealed cell, containing an embryo queen. Here the orifice *a* is capped, and the cell walls are thickened preparatory to being extended in the direction of the dotted lines *b b*.



Fig. 3. Represents the cell thus elongated enclosing a hollow space exterior to the cap of the true cell, and exhibiting the indentation or ornamentation of the surface. The hollow space is sometimes so small as to be almost inconspicuous. The ornamentation when elaborately executed, resembles shallow or rudimental worker-cells.

The hollow space is sometimes so small as to be almost inconspicuous. The ornamentation when elaborately executed, resembles shallow or rudimental worker-cells.

Fig. 4. Is a longitudinal section of fig. 3. The space *a* is the true cell; *b* the anterior hollow space; *c c* the thickened cell walls.





Fig. 5. Shows the cell as seen after the anterior compartment has been removed or demolished, exposing to view the convex cover or cap, *a*.

Fig. 6. Shows the cap *a* thickened or strengthened, to secure the immature queen against injury. When severed from the cell by the queen's mandibles, the cap resembles *a b* fig. 6.



After undergoing these changes and modifications, the royal cell, forsaken by the queen, resembles fig. 7.

The highly important fact that young queens soon after emerging from the royal cell, leave their hives to meet the drones, and that their fecundation is effected in the open air, was discovered by Janscha, the superintendent of the Apiarian Institute—established at Vienna, by the Empress Maria Theresa. Many years after, Huber confirmed the truth of the discovery, and made it more extensively known. But both Janscha and Huber were denounced as deceivers and charlatans by the conceited Spitzner, who denied that the drones were males, and that the queens ever made excursions to meet them. So well did he and his partizans succeed in suppressing the truth, by pertinaciously traducing its advocates, that it was lost sight of for more than half a century, and wholly disregarded till Dzierzon again brought it into notice, when proclaiming its intimate connection with his own system of bee culture.

Every colony that contemplates swarming, will, for some time previous, cease to work as industriously as it might do in view of its members. A disposition to "hang round" indolently seems to seize a majority of the population, and they cluster together in masses, apparently for the purpose of helping each other to do nothing. But get control of them, permit no natural swarming, furnish them with continual opportunities to be doing something, and you will not perceive among them any tendency to idle away time.

CHEMICAL NATURE OF HONEY.

The nectar of flowers, as gathered by the bees, is a watery solution of cane sugar. With the aid of heat it gradually becomes converted into grape sugar. In the process of this transformation the cane sugar is decomposed into the three kinds of sugar which constitute honey. Hence, honey would seem to be a variable substance representing the transitional stage of the conversion of cane sugar into grape sugar. All that the bees contribute to this process of transition and conversion, is the heat which they generate and maintain in the hive. The conversion can be effected by weak acids, as well as by moisture and heat.—M. SOUBEIRAN.

HATCHING OF BEES' EGGS.

The time within which bees' eggs will hatch, depends very much on the temperature to which they are exposed. Gundelach says, that in one instance they were hatched within twenty-four hours after being laid. Berlepsch says, he has known them to remain unhatched, in the hive, for forty-eight hours, and in one case more than seventy-two hours. He also mentions that he once removed a comb partially supplied with eggs, and kept it in his room more than a week before inserting it in a hive containing a queenless colony; yet in due time the larvæ issued. Mr. Kleine also states, that he kept a comb with sealed brood, in a box twenty-four hours, in cold weather, then gave it to a strong colony, and the brood matured.

BEES IN SILESIA.

In the province of Silesia, 260,000 colonies of bees are kept, representing a capital of more than one million of dollars. These, even in the most unfavorable years yield a profit of ten per cent.; and in propitious seasons, such as the year 1846 was, the yield was fully one hundred per cent., or more than \$1,000,000. It is well ascertained that the whortleberry and buckwheat blossoms are much richer in saccharine juices on the poor soil of Silesia than in more fertile districts.

In March, 1850, Dr. Kittell discovered that one of his colonies required feeding, and being unable to procure either pure honey or sugar candy, he concluded to try common brown sugar dissolved in warm water, so as to form a tolerably thick syrup. He fed them with this freely, and had every reason to be satisfied with the experiment. Brooding commenced as early and was continued as regularly in the colony thus fed, as in any of those which had ample stores of honey.

The Italian Bee.

BY THE REV. GEORGE KLEINE.

(Second Article.)

Conceding, as we may from the evidence adduced, the practicability of preserving and perpetuating the Italian race in its purity, another and equally important inquiry presents itself.—Does the Italian bee really possess any qualities or properties entitling it to a preference over the common bee?

Capt. Baldestein, who first called our attention to this race of bees, regarded it, from long experience and observation, as of high value in practical bee culture; and first suggested the important service it could be made to render in the elucidation of theory. M. de Prolius, who had long and extensively cultivated it in Italy, when appealed to, was lavish in its praise. And Dzierzon, than whom there is no more competent judge, declared it was, in all respects, an interesting and most valuable acquisition. The general judgment is decidedly in its favor, wherever it has been introduced.

We shall advert first to the benefits resulting from the introduction of this bee, in the final settlement of questions controverted among apirians. So many novel principles had recently been suggested and advocated; so many old and long-forgotten opinions had been revived; and so many others, long-acknowledged and cherished, had been repudiated; that doubt and uncertainty prevailed extensively, and there was a readiness to seize and use whatever promised fairly to explode error and establish truth.

Respecting the fecundation of the queens, widely different and very contradictory opinions were entertained. Such of these as were based on imperfectly-observed facts or illogical deduction, readily yielded when subjected to scrutiny. But the mere concoctions of an idle brain, baseless, and purely imaginative, were more difficult to manage—there being in fact nothing to take hold of. Magerstedt and others contended that fecundation was wholly unnecessary, and that queens became fertile simply from "bodily exercise" in the open air, or from mere atmospheric influences. Now, so long as the matter could not be brought to some tangible test, such notions and others equally absurd might be avowed, and even challenge refutation, without incurring the risk of more than an occasional sneer. But all this was suddenly changed by the introduction of the Italian bees. Numerous well-authenticated cases were soon reported, where the occurrence of a mixed breed in colonies, showed that an actual concourse

of queens with drones of a different race must have taken place. Young Italian queens produced an impure stock; and from young queens of the common race, sprang a progeny irregular and mixed. The fact of fecundation was thus established by its manifest results.

Then, also, recurred the much-mooted question, whether the fecundation of the queen, once accomplished, was efficacious during her life. This had frequently been discussed, but never conclusively settled, till it was determined beyond controversy, by an appeal to the Italian race. It was ascertained that an Italian queen, fecundated by an Italian drone, and introduced in a hive of common bees, continued, under all circumstances, to produce genuine Italian progeny during her life. This, in connection with the fact that it is exceedingly difficult to prevent young Italian queens from being bastardized, when common drones abound in an apiary, may be regarded as satisfactory evidence that fecundation continues effective during the life of a queen; and for this evidence we are indebted to the Italian bee.

The opinion that the queen is the sole mother of the colony, laying all the eggs from which the brood proceeds, had long been entertained, and was generally acquiesced in, till Riem made the remarkable discovery, that the workers, though usually regarded as neuters, were capable of laying drone-eggs. This discovery was, seemingly, so anomalous and incredible, that Bonnett, to whom Riem sent an account of it, cautioned him against announcing so manifest an error, lest he should forfeit his well-earned reputation as a careful and reliable observer. When Huber and others, subsequently, demonstrated that Riem's discovery was unquestionably true, Knauff immediately used it as the substratum, in part, of a new theory, which was very favorably received. According to it the queen lays only the worker-eggs, whilst certain female bees—which he called drone-mothers, lay the eggs from which the drones proceed. Dzierzon early attacked this theory, and thereby involved himself in a protracted controversy with its advocates, which was still prosecuted with all its original ardor and acrimony, when the Italian bee brought it to a sudden close. One of the most strenuous defenders of Knauff's theory announced that the Baron of Berlepsch had introduced Italian queens in hives of common bees, after removing the native queens. This was to serve as a test experiment. If in the following spring Italian drones were hatched in these hives, it would have to be conceded that the queen lays drone-eggs; but if common drones issue, they must be regarded as proceeding from

eggs laid by the workers. Expectation perked up her ears, and curiosity put on her spectacles, awaiting the result in eager anxiety. Spring came, and in due time an abundance of Italian drones issued, not only from the Berlepsch hives, but also from hundreds of others in which Italian had been substituted for common queens. Thus the new race became the means of settling, definitely, another important question in bee culture.

The most striking point in the Dzierzon theory, and one of the most startling physiological doctrines ever enunciated, is unquestionably his proposition that, among bees, the male sex is developed by parthenogenesis, and the female under the influence of male sperm. This doctrine was violently assailed on every hand. But Dzierzon, relying on his own personal observations, felt confident of its truth and maintained it against all opposition. Finally, when the General Apiarian Convention met, at Vienna, in 1853, he made the following announcement: "By the acquisition of the Italian bees, we are put in possession of the means of testing the truth or falsity of my hypothesis. If the drone-eggs are not influenced by the contents of the spermatheca, the drones must invariably resemble the mother, though she be fecundated by a drone of another race." Numerous and diversified experiments were instituted early next season, and the results being found in accordance with Dzierzon's anticipation, opposition at once subsided. Naturalists long obstinately refused to admit the truth of the doctrine, because it conflicted so directly with what they regarded as indisputable.* Finally, however, they also had to yield to the evidence, though they did so manifestly with the utmost reluctance, saying: "One of the most *inconvenient* facts, destroying all hope of ever discovering any general law regulating animal re-production, has thus been forced on the acceptance of physiologists." Thus was another controverted matter disposed of, with the aid of the Italian bee.

There was less difference of opinion as to whether the fecundation of the queen is effected in the open air, or within the hive. Janscha and Huber, with the greater number of intelligent observers, believed that the queen necessarily must and always does leave her hive to meet the drone. This was the general sentiment, but it

was not unanimously concurred in; and many practical beekeepers still entertain doubt. But when Italian bees are introduced in any neighborhood where common bees are kept, a few seasons suffice to render the truth obvious. Young queens of the common race, will soon be found in various localities producing a mixt breed, though there be no Italian stocks within two miles of the apiary. Hence, these queens must, at least on one occasion, have left their hives to meet the drones; and to the Italian bees are we indebted for demonstrative evidence of the fact.

It was formerly a widely prevalent notion that the young bees were ready, and qualified, to engage in all the various labors and duties of the colony, at home or abroad, as soon as they emerged from the cell. Dzierzon was the first to express dissent, because his own observation led him to a different conclusion. His remarks may have induced some to doubt, but the general sentiment remained unchanged; nor was it till the Italian bees were introduced, that the truth, in this respect, was fully ascertained and acknowledged. On placing an Italian queen in a common stock, it is found that the young bees hatched from her eggs do not show themselves outside of the hive for nearly ten days after leaving the cells, though constantly occupied, meanwhile, in the interior. Nor do they begin to gather honey and pollen till they are nearly twenty days old. The difference in marking and color which distinguishes the Italian bees, made the fact so obvious, that the old notions had to be at once abandoned.


The comparatively brief life of the worker-bees, and the great mortality to which they are exposed, can in no way be so clearly exhibited as by the introduction of an Italian queen in a common colony. If early in May, such a queen be placed in a hive containing thirty thousand workers, scarcely a dozen of them will be found remaining on the first of August—the rest having perished, and their places being supplied by an equal multitude of another race.

Bees are commonly regarded as very inhospitable—unwilling to receive and entertain strangers. This is doubtless true, to a great extent, and in accordance with an instinct designed to secure self-preservation. Still the police regulations of the colony are not so stringent and exclusive as totally to prohibit the admission and naturalization of aliens. In every apiary where both kinds of bees are kept, some Italian workers will soon be observed passing in and out, peaceably and undisturbed among the common bees, and actively participating in the labors of the colony. Doubt-

* When men have, as they imagine, reduced a certain domain of thought to exact order, they are impatient of the springing up of contrary appearances, that, like the goblins in "*Fiust*," will not "dance in time" to the measure that regulates the rest.—*Edinburgh Review*, Oct. 1859.

less similar migrations take place in all apiaries, but are unobserved because there is no difference in the color of the workers—all wearing the same livery.

From the foregoing statements, the importance of the Italian bee, alike as it regards the theory and the practice of bee culture, will be apparent. There are, no doubt, other points also, in which, in the hands of intelligent apiarians, they can be made to render equally valuable service. The advantages already derived from them, amply justify the zeal and energy which the German beekeepers displayed to introduce and disseminate the race. It is a noble employment, even in the narrowest sphere, to labor for the attainment of truth, and the exposure of error.

 In the district of Altmärk, in the province of Brandenburg, the hives in common use are made of straw, with the entrance for the bees placed invariably about three inches from the top. It is three inches long and half an inch high. Bees are said to winter extremely well in these hives.


To secure early and strong swarms, as the chief elements of success, the beekeepers there feed their colonies moderately, every evening, with diluted honey. They commence this feeding early in the season, and continue it till the fruit trees begin to blossom, and then use undiluted honey till the blossoms drop.


MR. A. BRAUN ascertained by careful weighing that one of his colonies lost $\frac{3}{4}$ oz. in weight daily, from the first of October to the fifth of February; and that the daily loss from the fifth of February to the thirty-first of March was three ounces. During the former period there was very little brood in the hive; during the latter, there was a considerable amount of it. It is thus made manifest that the brood required a large quantity of honey—especially when we consider that the weight of the brood is not here taken into account.


MR. HOFFMAN, of Vienna, mentions that on stupefying bees with ether, nearly one half of the whole number never revived. And Mr. Gabanz states that when etherizing a hive the entire population deserted it, though it contained much brood and ample supplies of honey. In an experiment made by me some years ago, to test the effect of ether where the bees were allowed free egress, they rushed out in clouds almost instantaneously, and the whole of them could, no doubt, have been expelled in a very short time. U. Y


HONEY IN CUBA.


There are in the island of Cuba, 12,500 apiaries, distributed in suitable localities. These furnish annually 20,000 cwt. of wax for export to Mexico alone, besides the enormous quantity of honey sent to Europe and the United States. The business is conducted on a very extensive scale, but in a primitive, rude, and slovenly manner. Vast as are its products, it still falls far short of what it might be made to yield. The quantity of honey produced might be immensely increased, and its quality greatly improved.

 A swarm just hived should never be placed at the side of a strong colony that has not yet swarmed, because if the weather on the next ensuing days be fine, the bees of the old stock will issue in great numbers, about noon, and disport in front of their hive. The bees of the swarm not having yet become well accustomed to their new location, will, on their return, be attracted by the busy, joyful hum of their neighbors, and tempted to join them. A loss of bees from this cause, at a time when no brood is maturing in its hive, is a very serious injury to a young swarm.

 In Denmark, where bee-culture was for a long time greatly neglected, there were, according to an official report, 86,036 hives of bees in the year 1858. This would average for the whole country only one colony to every 100 acres, or six to the square mile. The net exports in 1846, were 41,866 lbs. of wax, 137,077 lbs. of honey, and 28,053 gallons of mead. The annual product of the country is estimated at 184,150 lbs. of wax, 1,630,860 lbs. of honey, and 35,828 gallons of mead. This is supposed to be a low estimate.

 Even strong and healthy colonies may be attacked by robbing-bees and overpowered, if the hives are so placed as to be exposed to the direct rays of the sun on a hot day, and bees from another apiary have to fly over them on their way to and return from a locust or linden grove, or buckwheat field, or an orchard, when either of these is in bloom.

 The incipient enlargement of a pollen cell, as preparatory to its conversion into a royal cell, is an infallible evidence of the queenless condition of a colony.

 The Favignasense have a saying, that honey is the drink, pollen the meat, and water the medicine of the bees.



AMERICAN BEE JOURNAL.

Philadelphia, February, 1861.

TO CORRESPONDENTS.

All who are interested in the subject of Bee Culture, are respectfully requested to contribute to our columns. Communications to insure insertion, should be sent in by the first of the month at the latest, and as much earlier as possible.

Address them to A. M. SPANGLER & Co., Publishers, "AMERICAN BEE JOURNAL," No. 25 North Sixth Street, Philadelphia.

A number of communications intended for this number have been received. We give place to several—all we could find space for. The others will appear in our next.

SEND US THE NAMES OF BEEKEEPERS.

Quite a number of friends have complied with the request made in our last, regarding the names of Beekeepers. We now repeat the request, as we are very desirous, if possible, of bringing the Bee Journal before the notice of every apiarian in this country.

Send us names, friends! and we will supply the specimen copies.

CLUB RATES OF THE BEE JOURNAL.

Single Copy, - - - One Dollar.

Five Copies, - - - Four Dollars.

Ten or more copies, Seventy-five cents each.

Each Dollar Subscriber will receive a prepaid copy of either the "*Year Book of the Farm and Garden*," or of "*Both Sides of the Grape Question*," as a premium.

ADDITIONAL INDUCEMENT.

We will furnish the "AMERICAN BEE JOURNAL," and the "FARMER AND GARDENER" for one year, with a prepaid copy of either one of the Premium Books, for the trifling sum of *One Dollar and Fifty Cents*.

TO EXCHANGES.

Will our Editorial brethren who receive this number of the "Bee Journal," do us the favor to notice its advent, and at the same time open an exchange with the Bee Journal? We shall take pleasure in reciprocating the favor in any way in our power.

OUR PROSPECTS.

We are certainly under deep obligations to our friends in every part of the country, for the exceedingly kind manner in which they have received our first number. Our mails are crowded with complimentary letters, and the responses to our request to furnish the names of beekeepers, have been all we could expect or desire. Our subscription list marks a most healthy rise, and in fact, the future of the "BEE JOURNAL" is promising in every particular. What shall we say to all this? We can only return our sincere thanks to the friends who have so kindly aided in pushing forward our enterprise; hoping to repay them in a small degree, by rendering the Bee Journal interesting and valuable. May we not trust that this feeling of interest will continue, and that we shall be sustained? We have not a doubt of it, and we will leave nothing undone which will in any degree tend to merit a continuance of the valuable assistance already extended us by the friends of bee culture.

REMITTANCES.

Those who wish to remit money for subscriptions are respectfully requested to observe the following suggestions:—

Give the Name, Post Office, County and State in full. Write them so plainly that they can be read with ease.

In sending money we prefer gold. Gold dollars can be sent with safety, if fastened to the letter sheet by having a small piece of paper glued or pasted over them.

The notes of all solvent banks will be taken for subscriptions.

THANKS.

We herewith tender our most hearty thanks to our Editorial brethren everywhere, for the exceedingly kind manner in which they have noticed the advent of the "American Bee Journal." It will be impossible to reciprocate these favors as we could desire. Will our brethren take the will for the deed?

PRINTING.

We are prepared to execute orders for Plain and Fancy Book and Job Printing, at short notice, in good style, and on reasonable terms. We give special attention to Catalogues, Pamphlets, &c. Those who desire good work, at low rates, are requested to call and examine specimens.

CORRECTION.—In the slip which was sent with a number of copies of our Journal, the terms should be \$1.00 instead of \$1.50.

Monthly Management.

FEBRUARY.

With the increasing length of the days, the sun's influence becomes more and more perceptible in this month. All nature seems preparing to revive, and the bees chime in with the common impulse. Even in the more rigorous winters some brood will now be found in the combs, unless the colonies are weak and ill-supplied. Extensive brooding at this early period, however, is not desirable, and the beekeeper's endeavor should be to repress it as much as possible, because generally it does more harm than good. When bees have brood to nurse, they are impelled to venture forth more frequently and in larger numbers, and many more are lost from stress of weather or sudden changes, than can be replaced by the maturing brood. The stores of honey and pollen are also rapidly diminished to supply the wants of the larvæ; and hence, in the most favorable event, the resulting advantage is of small account. The stores required to nurture the young which barely serve to keep up the population, had better be reserved to sustain the old bees, if a late spring should follow. There is danger also that an old queen, prematurely urged to lay eggs, may die from exhaustion at a time when, from the want of drones, her place cannot be supplied, and the colony be ruined in consequence. He that would carry his stocks through the winter cheaply, safely, and in good health, must strive to keep his bees in perfect repose as long as possible. The more quiet they can be kept, the more their hives are shielded from the sun's rays, and the less they are allowed to feel the approach of spring, the less honey will they consume, and the better will they be able to bear confinement. But it is not always practicable to accomplish this, where bees are wintered on their summer stands; and if a fine mild day occurs in this month, it is well to give them an opportunity to fly, that they may discharge their fæces. Then screen the hives again from the sun, till the winter is fairly over. Stocks which are wintered in a vault or dark chamber should not now be brought out, unless the bees appear restless, because when they have once flown they are apt to commence brooding if replaced in the depository, and it is then difficult to keep them in repose—being instinctively inclined to roam abroad when they have larvæ to nurse.

If the ground is covered with snow when the bees are thus allowed to fly, some loose straw or hay should be scattered over it, in front of the hives, to prevent such as fall from becoming chilled.

If colonies are to be removed to new locations in the apiary, this had better be done before they are allowed to fly. Though the bees do not all forget their old location, even after four months' confinement, they readily at this season accustom themselves to a new one, if they can make their first excursion on a fine, clear, mild day, which permits them to issue in masses. The general joyful humming which then ensues, serves as a mutual attraction to keep them together, and designates the position of their new home. Offering them a little diluted honey and closing the entrance for a few minutes when they begin to issue, will rapidly increase the excitement, and cause them to rush out with redoubled animation.

If the weather be sufficiently mild to allow the bees to fly, movable comb hives may now be opened, to inspect the state of the stores. Should additional supplies appear to be needed, some frames containing honey in sealed combs may be inserted, which is the best and easiest mode of providing for the wants of a colony. But if no such combs are at hand, sticks of candy laid on the frames, or pushed down between them among the bees, are the best substitute. Even in colonies well supplied with stores, frames with sealed honey may now be advantageously removed from the sides of the hives, and placed nearer the clustered bees, so as to be more readily accessible if cold weather ensue.

If hives are to be removed to a distance, it is best to defer it till the bees have had an opportunity to discharge their excrements. The sooner thereafter the removal is effected the better, because it is always attended with less trouble and risk when there is not much brood in the combs, and no new comb has yet been built.

Colonies which have brood require water, and many bees are lost on their excursions to procure it. It should, therefore, be furnished to them in some sheltered nook convenient to the apiary, or poured in some old comb and placed in the hive. If they have much brood, they will consume honey rapidly, and need looking after occasionally, that their wants may be seasonably supplied.

ADVERTISEMENTS.

We are prepared to give room to a limited number of advertisements, at fair rates; but we shall in no case intrude them upon the space now set apart for reading matter. As we are printing large editions, it furnishes a most desirable medium for bringing matters interesting to a large number of our readers, prominently forward. Advertisements should be forwarded to us on or before the 20th of the month. For terms, see second page of cover.